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Davis

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(54) **INFLATABLE DISPLAY DEVICE**

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362/249.14, 249.16–249.19, 311.01,
362/311.13, 653, 811, 812; 40/214, 540;
446/220

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F21V 3/02 (2006.01)
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F21W 121/00 (2006.01)
F21Y 101/02 (2006.01)

(52) **U.S. Cl.**

CPC **G09G 5/36** (2013.01); **A63G 31/12** (2013.01);
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(58) **Field of Classification Search**

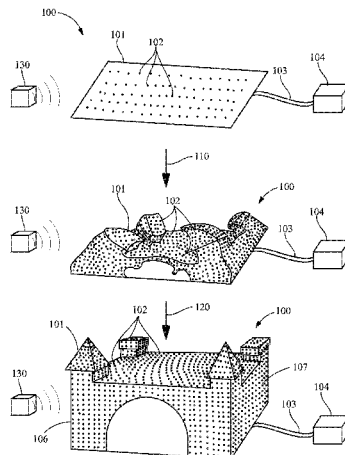
CPC A63H 2027/1058; A63H 27/10; A63H
2027/1075; A63H 3/06; E04H 15/20; F21S
4/001; F21S 6/00; F21V 3/023; F21V 3/026;
F21V 23/00; F21V 21/08; F21V 5/002;
F21W 2121/00; F21Y 2101/02; G09F 27/007;
G09F 21/10; G09F 21/14; H01Q 15/163;
Y10S 116/09; Y10S 362/812

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ABSTRACT

An inflatable display device is provided. The inflatable display device includes an inflatable support device, and a plurality of illumination sources, each of the illumination sources secured to the inflatable support device. The illumination sources are arranged in a preconfigured pattern on the inflatable support device, the preconfigured pattern resulting in the appearance of a continuous display. Another inflatable display device includes a cast silicon material, and a plurality of illumination sources, the illumination sources positioned within the cast silicon material. The cast silicon material forms an inflatable structure having a predetermined three dimensional configuration. Another inflatable display device includes an inflatable support device, a plurality of illumination sources, each of the illumination sources secured to the inflatable support device, and a control system coupled to the illumination sources. The control system coordinates operation of the plurality of illumination sources to form the appearance of a continuous display.

28 Claims, 4 Drawing Sheets



US 9,418,627 B2

Page 2

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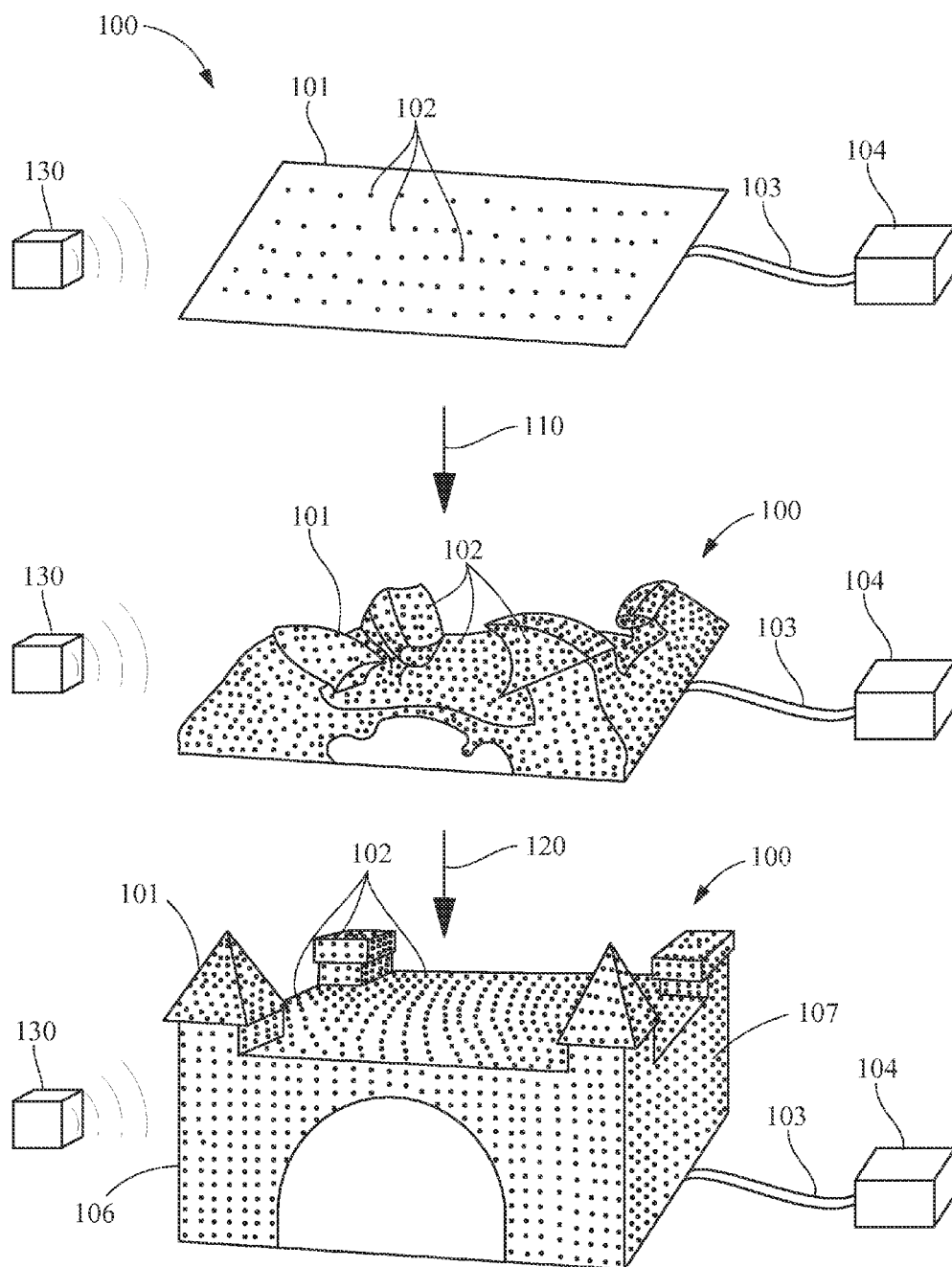


FIG. 1

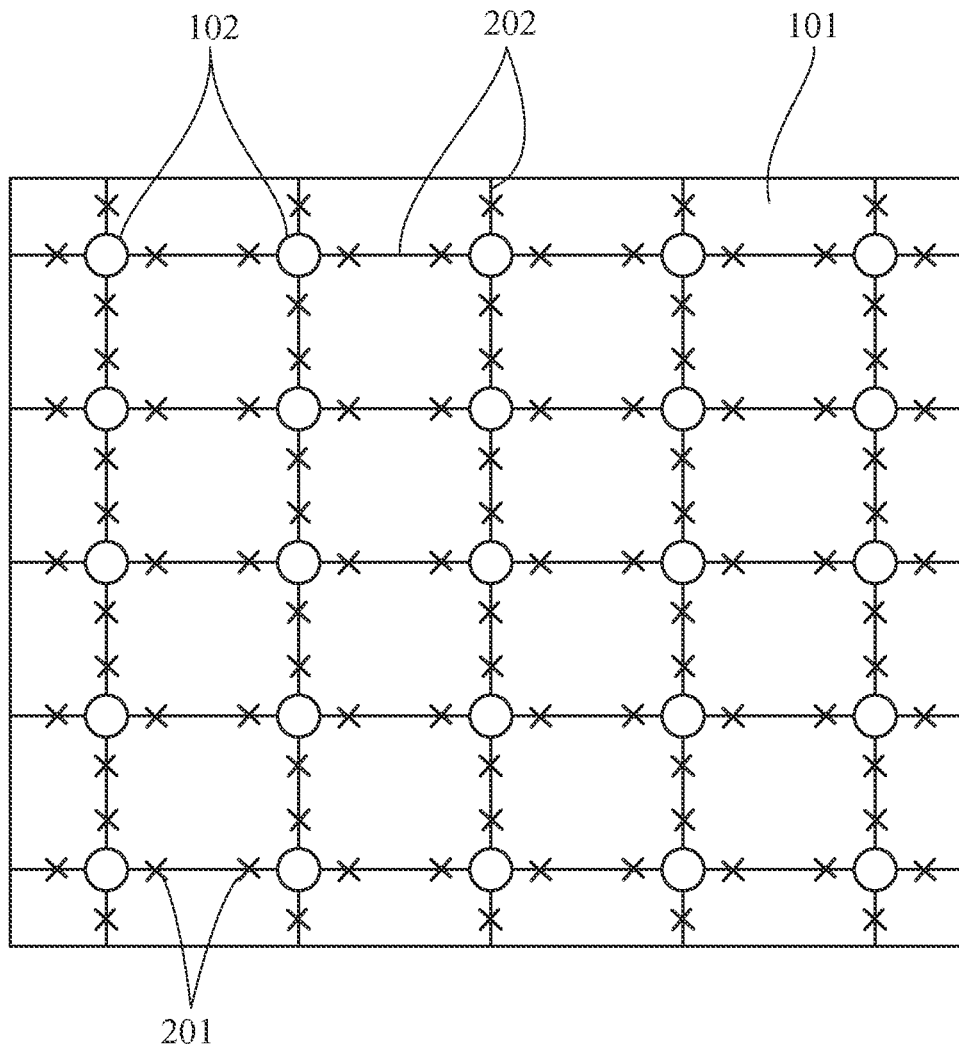


FIG. 2

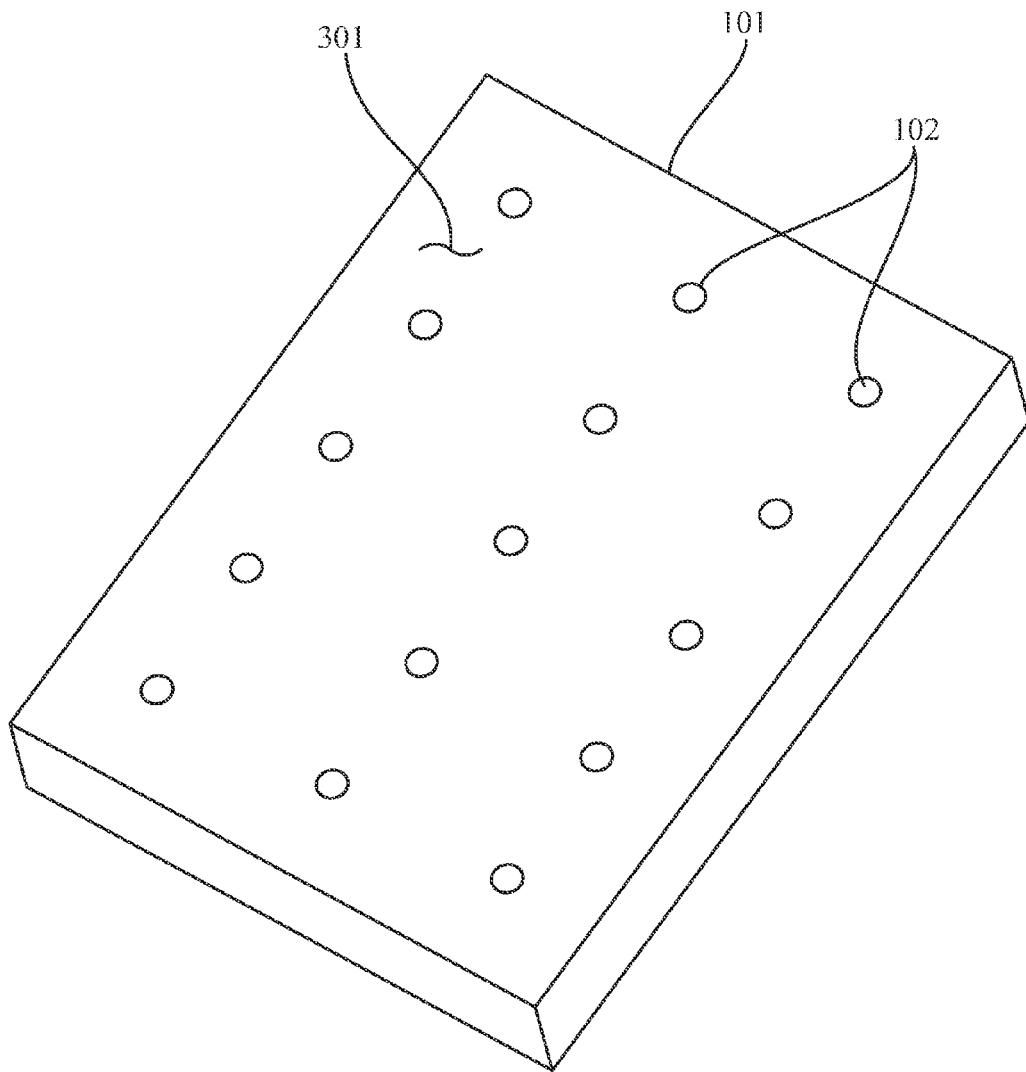


FIG. 3

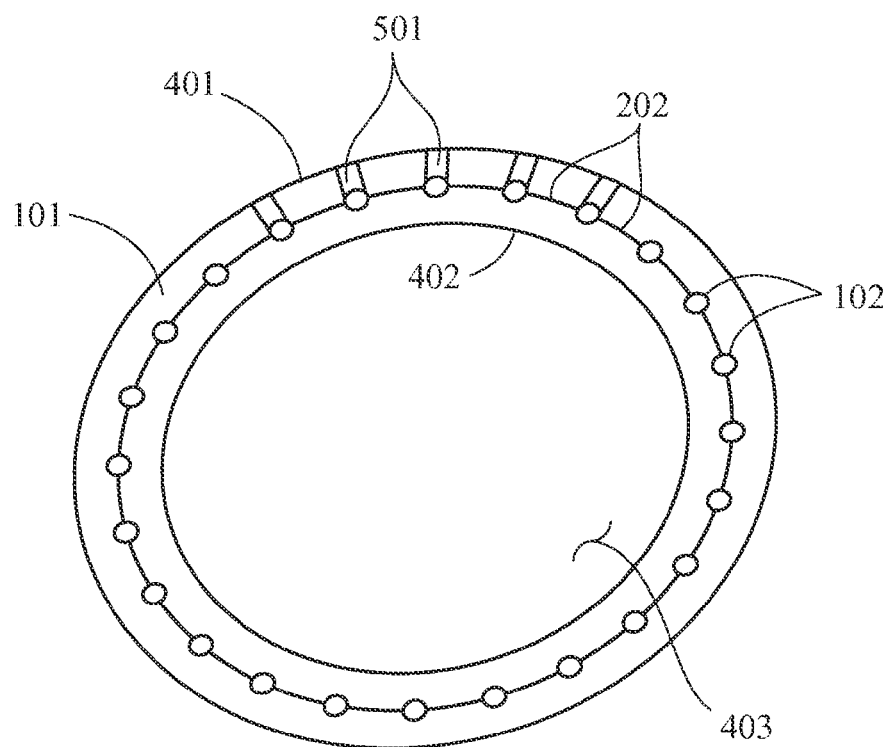


FIG. 5

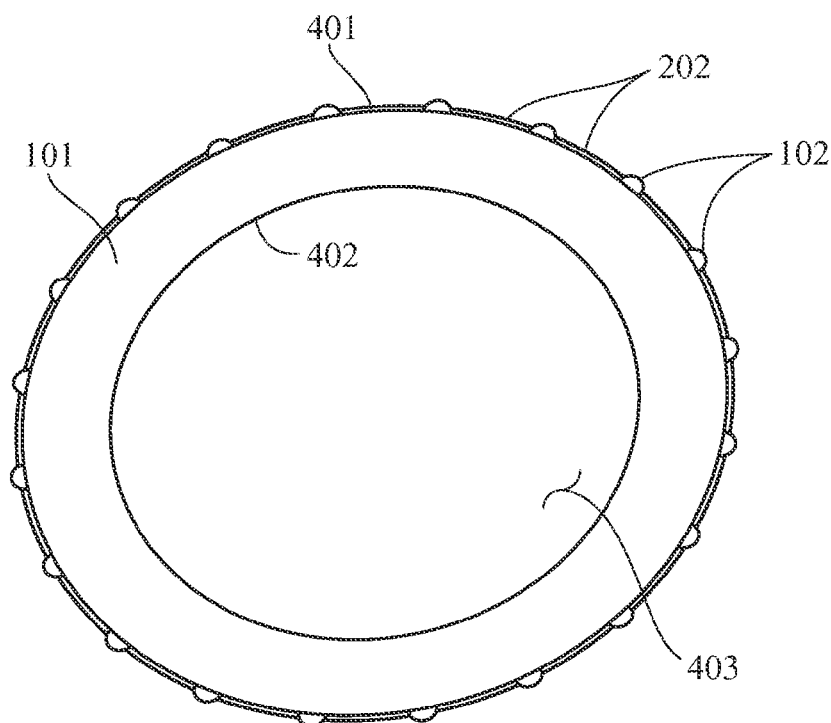


FIG. 4

1

INFLATABLE DISPLAY DEVICE**FIELD OF THE DISCLOSURE**

The present disclosure relates to inflatable display devices. More specifically, the present disclosure relates to inflatable light emitting diode display devices.

BACKGROUND OF THE DISCLOSURE

Display systems, such as those used in venues for public performance, often require disassembly, transportation, and reassembly between each performance. The disassembly, transportation and reassembly can be expensive, complicated and time consuming. One method of addressing these concerns includes the use of an inflatable support structure.

Inflatable objects can be quickly inflated and/or deflated to form a support structure. Many support structures formed by inflatable objects are used to support a separate display screen. The separate display screen must be positioned on the inflatable support structure after inflation, and removed from the inflatable support structure prior to deflation. The inflatable support structure can be unstable, requires set-up beyond inflation, and cannot form a display screen having the geometrical configuration of the inflatable objects.

In addition to supporting separate display screens, the inflatable objects have supported strings of lights, both internally and externally. The lights may illuminate the inflatable objects from within, or flash in a predetermined manner to form a light display. However, the strings of lights do not form display screens capable of showing videos, and do not form display screens having the geometrical configuration of the inflatable objects.

Therefore, there is an unmet need to provide inflatable, transportable visual displays capable of forming a preconfigured shape, functioning as a light source, and as a video display. Such abilities either alone or in combination can provide an intriguing, highly entertaining visual experience, while at the same time being increasingly easy to disassemble and transport.

SUMMARY OF THE DISCLOSURE

One aspect of the disclosure refers to an inflatable display device including an inflatable support device and a plurality of illumination sources, each of the illumination sources secured to the inflatable support device. The illumination sources are arranged in a preconfigured pattern on the inflatable support device, the preconfigured pattern resulting in the appearance of a continuous display.

Another aspect of the disclosure refers to an inflatable display device including a cast silicon material and a plurality of illumination sources, the illumination sources positioned within the cast silicon material. The cast silicon material forms an inflatable structure having a predetermined three dimensional configuration. The illumination sources in the predetermined three dimensional configuration form the appearance of a continuous display.

Another aspect of the disclosure refers to an inflatable display device including an inflatable support device, a plurality of illumination sources, each of the illumination sources secured to the inflatable support device, and a control system coupled to the illumination sources. The control system coordinates operation of the plurality of illumination sources to form the appearance of a continuous display.

2

An advantage of the present disclosure is that the inflatable display device provides a transportable display having a decreased set-up and removal time.

Another advantage of the present disclosure is that the plurality of illumination sources remain attached to a deflated inflatable display device.

Yet another advantage of the present disclosure is that the inflatable display device provides a three dimensional display that produces video.

Yet another advantage of the present disclosure is that the inflatable display device provides a video screen upon inflation, without further set-up.

Further aspects of the method and system are disclosed herein. The features as discussed above, as well as other features and advantages of the present disclosure will be appreciated and understood by those skilled in the art from the following detailed description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows inflation of an inflatable display device according to an embodiment of the disclosure.

FIG. 2 is an enlarged section of an inflatable display device according to an embodiment of the disclosure.

FIG. 3 is an enlarged section of an inflatable display device according to an embodiment of the disclosure.

FIG. 4 is a cross-sectional view of an inflatable display device according to the inflatable display device of FIG. 2.

FIG. 5 is a cross-sectional view of an inflatable display device according to the inflatable display device of FIG. 3.

Wherever possible, the same reference numbers will be used throughout the drawings to represent the same parts.

DESCRIPTION OF THE DISCLOSURE

Provided is an exemplary inflatable display device. Embodiment of the present disclosure, in comparison to devices not using one or more of the features disclosed herein, reduce set-up time, reduce removal time, permit the reduction or elimination of the need for vertical supports within display device thereby significantly reducing the weight of the overall system, permit assembly by personnel having little or no technical skill, increase ease of storage, increase ease of transportation, or a combination thereof.

Referring to FIG. 1, in one embodiment, an inflatable display device **100** includes a plurality of flexible illumination sources **102** secured to an inflatable support structure **101**. Flexible, as used herein, refers to an ability of the illumination sources **102** to independently move relative to each other. The illumination sources **102** remain secured to the inflatable support structure **101** throughout an inflation and/or deflation of the inflatable display device **100**. The illumination source **102** is any suitable illumination source capable of producing a plurality of colors and/or intensities. Suitable illumination sources **102** include, but are not limited to, one or more LEDs, organic light emitting diode OLEDs, incandescent bulbs, fluorescent bulbs, polymer light emitting diodes, electroluminescent lights, other suitable illuminating or light emitting sources, or a combination thereof.

A hose **103** couples the inflatable support structure **101** to a pump **104**, the pump **104** inflating and/or deflating the inflatable display device **100**. The pump **104** directs a gas (step **110**) to an interior portion **403** (FIG. 4) of the inflatable support structure **101**. The gas is any suitable gas capable of inflating an object. Suitable gasses include, but are not limited to, oxygen, nitrogen, helium, air, or a combination thereof. The gas fills the interior portion **403** of the inflatable support

3

structure **101**, expanding the inflatable support structure **101** in the X, Y and Z planes. An amount of the gas is maintained (step **120**) within the inflatable support structure **101**, forming the inflatable display device **100** having a three dimensional shape.

A video screen in the three dimensional shape of the inflatable support structure **101** is formed by the illumination sources **102** secured to the inflated inflatable support structure **101**. In one embodiment, the inflatable support structure **101** is inflated and immediately ready to provide video images (video). For example, the deflated inflatable support structure **101** is positioned prior to the start of a performance, inflated during the performance and provides the video immediately upon inflation. The integral illumination sources **102** eliminate a need for post-inflation set-up, providing for control of the inflatable display device from a remote position.

In one embodiment, the illumination sources **102** are connected by electrical and/or control wires **202** (wires) or other connectors or wireless connections. In one embodiment, the illumination sources **102** are connected to each other in a grid pattern of the wires **202**. The wires **202** are connected to the illumination sources **102** by any suitable technique or connector. In one embodiment, the wires **202** are arranged in conjunction with a flexible support to provide selective distribution of weight of the inflatable display device **100**. In one embodiment, the wires **202** provide the flexible support for the illumination sources **102**. In one embodiment, the illumination sources **102** are connected with wires **202** that are fiber-optic cables permitting the light to be emitted from various sources. In another embodiment, the wires **202** may be translucent, transparent, semi-transparent, semi-translucent, semi-opaque, opaque, or combinations thereof.

In one embodiment, the illumination sources **102** are wirelessly connected. The wireless connections provide wireless control and/or wireless power to the illumination sources **102** from a remote location. Utilizing wireless control and/or wireless power reduces weight and increases portability. In one embodiment, the wirelessly connected illumination sources **102** are powered by individual batteries housed with light emitting diodes (LEDs) or other light sources. Another embodiment includes organic light emitting diodes (OLEDs) as LEDs. OLEDs reduce power requirements and permit longer operation on the same charge. Additionally, OLEDs permit the inflatable display device **100** to run on the same charge for an increased period of time as compared to LEDs.

A control panel **130** is coupled to the illumination sources **102**, providing power and/or coordinating operation. In one embodiment, the control panel **130** is remote to the inflatable display device **100** and/or integrated into controls of a theatrical performance. In another embodiment the control panel **130** is wirelessly connected to the inflatable display device **100**. In one embodiment, the control panel **130** is electrically connected to the display device **100** thereby permitting power and/or signals to travel to the illumination sources **102**.

The inflatable display device **100** includes a plurality of the illumination sources **102** arranged and disposed in a preconfigured pattern to form a suitable continuous display. Suitable continuous displays include, but are not limited to, an illusion of a continuous image (for example, when viewed from a typical viewing distance within a venue), a three-dimensional image, a landscape image, a portrait image, a text image, a text string image, moving image, video, dynamic visual effect, or a combination thereof.

The continuous display on the inflatable display device **100** is coordinated by the control panel **130**, which varies the colors and intensities of the illumination sources **102**. A suitable control panel **130** includes any suitable control means

4

(not shown) known in the art for providing images and/or video. The control panel **130** coordinates adjacent illumination sources **102** to form an illuminated image emanating from the inflatable support structure **101**. The illuminated image is controlled in real time to produce the video. The real time control of the video image reduces or eliminates pre-programming of a display prior to an event.

In one embodiment, the illumination sources **102**, such as LEDs (not shown), are closely spaced thereby creating a high resolution image, series of images, and/or video. Video, as used herein, refers to the movement of visual images. Decreasing the number of the illumination sources **102** and/or increasing the space between adjacent illumination sources **102** decreases the resolution of the display screen **100**. In one embodiment, each illumination source **102** is an LED pixel. The plurality of illumination sources **102** forms a low resolution video screen.

Referring to FIG. 2 and FIG. 4, in one embodiment, the plurality of illumination sources **102** are secured to the exterior surface **401** of the inflatable support structure **101**. In one embodiment, the plurality of illumination sources **102** are sewn to the exterior surface **401** with stitches **201**. The stitches **201** secure the illumination sources **102** without puncturing the interior surface **402** and/or allowing the gas within the interior portion **403** of the inflatable support structure **101** to escape. The stitches **201** are placed such that they do not inhibit the inflatable support structure **101** from contracting or expanding during inflation or deflation.

Referring to FIG. 3 and FIG. 5, in one embodiment, the illumination sources **102** are positioned within the exterior surface **401** of the inflatable support structure **101**, proximal to the interior portion **403**. Suitable attachment of the illumination sources **102** on the inside of the inflatable support structure **101** includes, but is not limited to, sewing, gluing, encapsulating, casting, or a combination thereof. In a further embodiment, the illumination sources **102** are positioned between the exterior surface **401** and the interior surface **402** of the inflatable support structure **101**. In one embodiment, the inflatable support structure **101** includes a transparent or semi-transparent material through which the illumination sources **102** are seen. In one embodiment, the inflatable support structure **101** includes illumination openings **501** through which the illumination sources **102** shine. The illumination openings **501** associated with each of the illumination sources **102** are sized differently from, or similar to, each of the other illumination openings.

A suitable inflatable support structure **101** for containing the illumination sources **102** includes a cast silicon material **301**. The cast silicon material **301** encapsulates the plurality of illumination sources **102**, securing the illumination sources **102** within the inflatable support structure **101**. The cast silicon material **301** secures the plurality of illumination sources **102** within the inflatable support structure **101** throughout inflation and/or deflation. Additionally, the cast silicon material **301** protects the plurality of illumination sources **102** from damage such as, but not limited to, incidental contact, storage, transportation, moisture, weather, or a combination thereof.

The inflatable support structure **101** is deflated to increase ease of storage and transportation. The pump **104** reverses a flow of gas through the hose **103** to remove the gas from within the interior portion **403** of the inflatable support structure **101**. Removing the gas from within the interior portion **403** of the inflatable support structure **101** deflates the inflatable support structure **101**, reducing its volume. In one embodiment, the inflatable support structure **101** folds in a

5

predetermined manner throughout deflation. The deflated inflatable support structure **101** has increased portability and ease of storage.

In one embodiment, the inflatable support structure **101** includes an integral storage and/or transportation apparatus. The integral storage and/or transportation apparatus contains the deflated inflatable support structure **101** and forms a base for the inflated inflatable support structure **101**. For example, in one embodiment, the integral storage and/or transportation apparatus is a cube having pivotable panels secured there to. The panels are lowered to form a base for the inflatable display device **100**, and raised to enclose the inflatable display device **100** during storage and transportation.

In one embodiment, at least a portion of the exterior surface **401** is substantially planar. In another embodiment, at least a portion of the exterior surface **401** is substantially non-planar. Portions of the exterior surface **401** have features that involve different visual effects, such as opacity, translucence, reflection, diffusion, transparency, or a combination thereof. Diffusion is intended to include prismatic diffusion of light into the visible spectrum, as required to achieve a desirable visual effect.

In one embodiment, the inflatable support structure **101** includes multiple portions. For example, referring to FIG. 1, in one embodiment the inflatable support structure **101** includes a top portion **105**, a first side portion **106** and a second side portion **107**. The top portion **105**, the first side portion **106**, and the second side portion **107** are secured to each other, forming the inflatable display device **100**. The portions are secured using any suitable securing means, such as, but not limited to interlocking features, clipping members, magnets, wire, rope, fasteners, or a combination thereof. In one embodiment, the single structure includes one or more openings for the gas and is inflated with one or more of the pumps **104**.

In another embodiment, the top portion **105**, the first side portion **106** and the second side portion **107** are separate and detachable from each other. Each portion includes one or more openings for the gas, and is individually inflatable. In one embodiment, the openings of multiple portions are coupled to form the inflatable support structure **101** having a continuous interior portion **403** between the top portion **105**, the first side portion **106** and the second side portion **107**. In one embodiment, the top portion **105** is secured to the first side portion **106** and the second side portion **107**, and the interior portion **403** of each portion remains separate from other portions. In another embodiment, the individual portions are secured to each other prior to inflation. In another embodiment the individual portions are inflated prior to being secured to each other.

While the disclosure has been described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the disclosure without departing from the essential scope thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this disclosure, but that the disclosure will include all embodiments falling within the scope of the appended claims.

What is claimed is:

1. An inflatable display device comprising:
a cast silicon material; and
a plurality of illumination sources, the illumination sources positioned within the cast silicon material;

6

wherein the cast silicon material forms an inflatable structure having a predetermined three dimensional configuration; and

wherein the illumination sources in the predetermined three dimensional configuration form the appearance of a continuous display.

2. The inflatable display device of claim 1, wherein the cast silicon material is substantially transparent.

3. The inflatable display device of claim 1, wherein the illumination sources comprise light emitting diodes.

4. The inflatable display device of claim 1, wherein a light produced by the light emitting diodes is displayed through the cast silicon material.

5. The inflatable display device of claim 1, wherein the cast silicon material shield the plurality of illumination sources from damage.

6. The inflatable display device of claim 1, wherein the cast silicon material increases a weather resistance of the plurality of illumination sources.

7. An inflatable display device comprising:

an inflatable support device including a cast silicone material; and

a plurality of illumination sources, each of the illumination sources secured to a surface of the inflatable support device;

wherein each of the illumination sources is positioned between an interior surface and an exterior surface of the inflatable support device;

wherein the illumination sources are arranged in a preconfigured pattern on the inflatable support device, the preconfigured pattern resulting in the appearance of a continuous display.

8. The inflatable display device of claim 7, wherein the illumination sources comprise flexible light emitting diodes.

9. The inflatable display device of claim 8, wherein the flexible light emitting diodes produce a plurality of colors.

10. The inflatable display device of claim 8, wherein the flexible light emitting diode illumination sources are movable relative to each other.

11. The inflatable display device of claim 7, wherein inflating the inflatable display device forms a predetermined three dimensional structure.

12. The inflatable display device of claim 7, comprising deflating the inflatable display device to decrease a size of the inflatable display device.

13. The inflatable display device of claim 7, wherein the plurality of illumination sources remain secured to the deflated inflatable display device.

14. The inflatable display device of claim 7, wherein the continuous display provides a continuous image selected from the group consisting of, a three-dimensional image, a landscape image, a portrait image, a text image, a text string image, a moving image, video, and dynamic visual effect.

15. The inflatable display device of claim 7, wherein the plurality of illumination sources form a lighted three dimensional structure.

16. The inflatable display device of claim 7, wherein the plurality of illumination sources are electrically coupled to each other.

17. An inflatable display device comprising:

an inflatable support device including a cast silicone material;

a plurality of illumination sources, each of the illumination sources secured to a surface of the inflatable support device; and

a control system coupled to the illumination sources;

7

wherein each of the illumination sources is positioned between an interior surface and an exterior surface of the inflatable support device;

wherein the control system coordinates operation of the plurality of illumination sources to form the appearance of a continuous display.

18. The inflatable display device of claim 17, wherein the control system coordinates the operation of each illumination source individually.

19. The inflatable display device of claim 17, wherein the inflatable display device produces a plurality of images.

20. The inflatable display device of claim 17, wherein the illumination sources comprise flexible light emitting diodes.

21. The inflatable display device of claim 20, wherein the flexible light emitting diodes produce a plurality of colors.

22. The inflatable display device of claim 20, wherein the flexible light emitting diode illumination sources are movable relative to each other.

23. The inflatable display device of claim 17, wherein inflating the inflatable display device forms a predetermined three dimensional structure.

8

24. The inflatable display device of claim 17, comprising deflating the inflatable display device to decrease a size of the inflatable display device.

25. The inflatable display device of claim 17, wherein the plurality of illumination sources remain secured to the deflated inflatable display device.

26. The inflatable display device of claim 17, wherein the continuous display provides a continuous image selected from the group consisting of, a three-dimensional image, a landscape image, a portrait image, a text image, a text string image, a moving image, video, and dynamic visual effect.

27. The inflatable display device of claim 17, wherein the plurality of illumination sources form a lighted three dimensional structure.

28. The inflatable display device of claim 17, wherein the plurality of illumination sources are electrically coupled to each other.

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